

Office, however, were also very low, and on the afternoon negative values were given. This occurred during cloudy, threatening weather.

At Boston, Massachusetts, a complete and valuable set of observations were made during the month of September. The greatest value obtained was at 3 p. m. of the 2d, equivalent to 640 volts, on a clear, cool day characterized by high barometric readings. The lowest occurred on the 18th, at 3 p. m., 316 volts on the negative side, just in advance of a thunder-storm, with a second minimum on the 10th at 11 a. m., of 9.6 volts on the negative side, during an interval of no rain in a rainy spell. Negative values were obtained as follows: on 10th, at 11 a. m., rain began at midnight and continued the whole day; on 18th, at 3 p. m., preceding thunder-storm at 3.15 p. m. The values at the 1 and 3 p. m. observations were respectively, positive, 515, negative, 316 volts. On the 25th, at 3 p. m., a feeble negative indication, the weather being threatening.

Rain occurred, in addition to the dates mentioned, on the 16th, previous to earliest observation, from 10.30 a. m. until 3.45 p. m., and on the 17th early in the morning; all day on the 23d and 28th. The rain of the 16th was accompanied by variable, high, positive values, the highest values occurring at those observations preceding the ending of the rain. The rain on the 23d was accompanied by rather low positive indications, although indications as low are noted at times during the clear weather preceding and following. The observations for the month are charted on the second diagram of chart vi.

At Columbus, Ohio, negative indications were recorded in the observations taken on the 22d, at 3 p. m., rain commencing at 6.40 p. m., and on the 23d at 1 p. m., very feeble. A thunder-storm occurred during the night of the 23d. On the 27th feeble negative indications were noted during rain.

At Ithaca, New York, a complete and interesting set of observations was recorded. Negative indications occur on August 30th, at the 11 o'clock observation, rain beginning at 2.40 p. m.; on September 12th, at three of the four observations, rain occurring throughout the day; on September 14th, at 9 a. m., rain beginning at 9.05 a. m.; on September 16th, during showery weather, and on September 26th, at 9 a. m., during light rain. Rain occurred upon other dates than those mentioned, as follows: on September 9th, in the evening; on September 17th, late in the afternoon; on the 19th, ending at 9 a. m., and during the nights of the 26th and 27th. Thunder-storms occurred during the night of the 18th, during the afternoon of the 19th, and during the nights of the 22d, 23d, 26th, and 27th.

At New Haven, Connecticut, during the last third of the month negative indications are not noted. Rain occurs but once, at 9.08 a. m., September 23d, and is accompanied by the highest noted positive potential.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various states and territories, as follows:

Alabama.—Mobile, 24th.
Colorado.—Montrose, 10th; West Las Animas, 10th, 12th.
Connecticut.—New London, 14th.
Dakota.—Webster, 10th.
Florida.—Archer, 6th, 7th, 17th, 18th; Key West, 7th, 24th.
Georgia.—Savannah, 16th.
Illinois.—Riley, 3d, 7th; Springfield, 6th, 24th; Pekin, 6th, 29th; Charleston, 18th, 21st; Anna, 30th.
Indiana.—Vevay and Jefferson, 1st; Sunman, 13th, 21st, 30th; Greencastle, 18th.
Iowa.—Cedar Rapids, 10th, 28th, 29th.
Kansas.—Yates Centre, 5th, 10th, 13th; Salina, 9th; Wyandotte, 7th, 14th; Westmoreland, 12th.
Kentucky.—Frankfort, 22d; Richmond, 30th.
Maine.—Cornish, 22d.
Massachusetts.—Somerset, 14th; Blue Hill Observatory, 14th, 26th; Milton, 26th.

Michigan.—Port Huron, 4th; Mottville, 15th, 18th; Marquette, 25th.

Minnesota.—Duluth, 18th, 20th; Moorhead, 20th.

Missouri.—Centreville, 24th, 30th.

New Jersey.—Clayton, 2d, 14th, 24th; Sandy Hook, 4th; Dover, 4th, 14th; Moorestown, 14th; Beverly, 29th.

New York.—Factoryville, Palmyra, and North Volney, 4th; Oswego, 4th, 15th, 22d; Buffalo, 10th, 15th; Albany, 22d.

North Carolina.—New River Inlet, 1st, 5th, 12th, 18th; Weldon, 12th.

Ohio.—Wauseon, 1st, 2d, 13th, 14th, 15th, 18th, 23d; Toledo, 18th; Tiffin, 21st.

Oregon.—East Portland, 22d.

Pennsylvania.—Dyberry and Wellsborough, 4th; Grampian Hills, 14th; East Brook, 30th.

South Carolina.—Spartanburg, 11th, 12th.

Tennessee.—Chattanooga, 19th; Nashville, 30th.

Vermont.—Lunenburg, 20th.

Virginia.—Lynchburg, 4th, 11th, 26th; Wytheville, 10th; Dale Enterprise, 8th, 9th, 12th, 13th, 14th, 23d, 29th; Variety Mills, 14th, 25th; Rappahannock, 20th.

Washington Territory.—Port Angeles, 4th.

Wisconsin.—Delavan, 3d.

Wyoming.—Fort Bridger, 1st, 28th.

LUNAR HALOS.

Lunar halos were observed in the various states and territories, as follows:

Alabama.—Mobile, 8th, 11th, 13th, 19th.

California.—San Diego, 9th.

Colorado.—Pike's Peak, 8th, 12th; Montrose, 10th; West Las Animas, 10th, 12th.

Connecticut.—New Haven, 11th, 13th; New London, 13th.

Delaware.—Cape Henlopen, 16th.

District of Columbia.—Washington City, 11th to 14th.

Florida.—Key West, 6th, 8th, 9th, 10th; Pensacola, 6th, 8th, 11th; Limona, 6th, 9th, 10th, 11th, 14th; Cedar Keys, 6th, 10th, 11th, 12th, 15th, 16th; Alva, 8th; Manatee and Alva, 10th; Sanford, 14th.

Georgia.—Savannah, 7th, 9th; Atlanta, 12th, 13th.

Illinois.—Pekin, 2d, 5th, 6th, 8th; Windsor, 5th; Springfield, 6th, 7th, 8th; Anna, 8th, 10th, 14th; Cairo, 12th; Riley, 16th.

Indiana.—Lafayette, 5th; Fort Wayne, 11th; Jeffersonville and Sunman, 12th; Vevay, 22d.

Iowa.—Independence, 14th.

Kansas.—Salina, 4th, 9th; Yates Centre, 7th, 14th; Wyandotte, 10th, 12th.

Kentucky.—Frankfort, 12th, 13th; Richmond and Louisville, 13th.

Louisiana.—New Orleans, 8th, 12th.

Maine.—Portland, 14th.

Massachusetts.—Somerset, 13th, 14th; Milton and Blue Hill Observatory, 13th, 14th, 15th; Princeton, 14th.

Michigan.—Escanaba, 8th, 21st.

Missouri.—Saint Louis, 9th; Lamar, 12th, 13th.

Nebraska.—De Soto, 5th; Hay Springs, 7th; North Platte, 10th, 11th.

New Jersey.—Beverly, 5th, 6th, 8th, 9th, 13th; Egg Harbor City, 5th, 13th; Atlantic City and Clayton, 13th.

New York.—Oswego, North Volney, and Palermo, 4th; New York City, 5th, 13th, 16th; Ithaca, 11th, 14th; Rochester, 12th; Le Roy, 12th; Setauket, 13th, 14th; Humphrey, 23d.

North Carolina.—Wilmington, 6th, 13th, 15th; New River Inlet, 8th; Charlotte, 13th; Smithville, 14th.

Ohio.—Napoleon, 4th, 9th, 11th; Columbus, 9th, 13th; Wauseon, Toledo, Cleveland, and Elyria, 11th; Cincinnati, 13th; Jacksonborough, 14th.

Rhode Island.—Block Island, 13th.

South Carolina.—Spartanburg, 12th, 13th.

Tennessee.—Milan, 5th; Knoxville and Memphis, 12th.

Texas.—Brownsville, 5th; Rio Grande City, 6th; Galveston, 6th, 11th, 12th; El Paso, 7th; Palestine, 13th.

Virginia.—Dale Enterprise, 7th, 8th, 9th, 11th, 13th; Rappahannock, 7th, 9th, 11th, 13th; Lynchburg, 9th, 10th, 12th; Chincoteague, 13th; Bird's Nest, 13th, 14th.

West Virginia.—Helvetia and Parkersburg, 13th.

Wisconsin.—Milwaukee, 6th, 11th, 16th; Green Bay and Embarras, 8th; Madison, 11th.

Wyoming.—Cheyenne, 14th.

The phases of the moon (Washington mean time) during September, as given in "The American Ephemeris and Nautical Almanac" for 1886, are as follows: New moon, 27th, 4 h. 10.4 m.; first quarter, 4th, 14 h. 47.3 m.; full moon, 12th, 17 h. 42.1 m.; last quarter, 20th, 12 h. 47.6 m.; apogee, 10th, 22.3 h.; perigee, 26th, 1.9 h.

MIRAGE.

Maricopa, Arizona: on the morning of the 15th a mirage was seen to the eastward of the station. The mountains were changed into fantastic shapes, resembling houses, ships, etc. Mirage was observed at other stations, as follows:

Salina, Kansas, 10th, 28th, 30th.

Tecumseh, Nebraska, 30th.

MISCELLANEOUS PHENOMENA.

DROUGHT.

Albany, New York, 9th: the rainfall of the past month has been very small and the drought is becoming severe in this vicinity; many wells are drying, and cattle are suffering from want of sufficient pasturage. The water in the river is low and navigation is nearly suspended.

Tolono, Champaign county, Illinois: the drought which has prevailed here since June was partially broken on the 17th by a heavy rain.

Fort Worth, Texas, 25th: reliable information from the drought-affected region of Texas shows that newspaper accounts have been only slightly exaggerated. The drought extends over the whole of the northwestern portion of the state, from Fort Worth up into the region commonly called the Panhandle. This was a fine grazing country and a large amount of stock is kept here. This year it has been impossible to supply the stock with water, and thousands have perished. People have been obliged to transport water many miles for household purposes. In some parts of this district no heavy rains have fallen during the past fourteen months, and, as a consequence, many of the smaller streams have become exhausted and wells and cisterns are dry.

Boisé City, Idaho: the total rainfall from July 4th until September 30th is only .01 inch. Since the land under cultivation in the valleys is irrigated, the damage here by drought is not great, but the cattle ranges on the mountains and hills are suffering severely from the dry weather.

EARTHQUAKES.

During September many light earthquake shocks were felt in the Southern States, especially from the 1st to the 7th, and on the 21st and 27th. The observers at Paolet and Kirkwood, South Carolina, state that earthquake shocks were felt nearly every day during the month. The shock of the 3d, at 11.01 p. m., was quite severe at Charleston, South Carolina, and created much excitement. In Augusta, Georgia, at the same time, a sudden motion of the earth was felt of about four seconds' duration, with a jerking motion from southeast to northwest. At Savannah slight shocks were felt at intervals during the 3d, and at 10.50 p. m. a very distinct motion occurred; it was preceded by a rumbling noise, and was accompanied by quick vibrations, which continued fifteen or twenty seconds. This shock was more severe than any felt since that of August 31st. Although no damage was done to buildings or other property, the shock caused much alarm, and many persons left their houses and again passed the night in the open air. The shocks of the 21st and 27th were of sufficient intensity in Charleston, Augusta, and Savannah to rattle windows and cause pictures and chandeliers to sway back and forth, and were accompanied by a low rumbling sound.

The following record of earthquake data for September, 1886, giving the place, day, hour, and, when the information could be obtained, the duration of the shocks, is compiled from the reports of the regular and voluntary observers of the Signal Service:

Florida.—Cedar Keys: 2d, 11.10 p. m.; 3d, 4 p. m.

Jacksonville: 1st, 4 and 4.30 a. m.; 8th, 1.34 p. m.; 9th, 1.47 p. m.

Sanford: 3d, 11.03 p. m., duration five seconds; 5th, 11.10 p. m., duration two seconds.

Archer: 22d, 10 p. m., duration three seconds.

Georgia.—Savannah: 1st, 12.45 a. m.; 1.11 a. m.; 3.44 a. m.; 8.35 a. m., duration three seconds; 2.43 p. m.; 5.12 p. m., duration six seconds; 5.50 p. m.; 11.54 p. m. 2d, 2.10 a. m., duration four seconds; 3.10 a. m., tremors at intervals during the day, accompanied by low, rumbling sound. 3d, 10.50 p. m., duration seventeen seconds, accompanied by rumbling sound. 4th, 3.45 a. m.; 4.22 a. m.; 11.26 a. m.; 3.09 p. m.; 3.18 p. m.; 9.30 p. m., duration four seconds, accompanied by low, rumbling sound; tremors during the night. 5th, 11.16 a. m.; 1.13 p. m.; 8.45 p. m.; 11.07 p. m., accompanied by sound, rattled windows. 6th, 8.37 a. m., tremors during the morning; 4.03 p. m., duration two seconds. 7th, 5.04 p. m., duration two seconds. 8th, 11.15 a. m., duration three seconds; 11.24 p. m. 11th, 2.32 p. m., duration four seconds. 21st, 5.20 a. m., duration twelve seconds, accompanied by rumbling sound, windows rattled. 27th, 5 p. m., duration four seconds.

Augusta: 1st, 4.35 a. m.; 8.10 a. m.; 5.14 p. m.; 11.28 p. m. 3d, 11 p. m., duration four seconds. 4th, 7.03 a. m.; 9.41 p. m.; 11.10 p. m. 5th, 11.05 p. m. 21st, 5.23 a. m., duration four seconds, windows rattled.

Atlanta: 3d, 11.05 p. m.

Athens: 1st, 4 p. m.; 10.45 p. m., duration one second. 3d, 10.10 p. m., duration twenty-five seconds. 4th, 8.35 p. m., duration twenty seconds.

Forsyth: 1st, 8 a. m.; 3d, 10 p. m.

North Carolina.—Charlotte: 1st, 1.04 a. m.; 5.19 p. m.; 10.03 p. m.; 11.10 p. m. 2d, 1.07 a. m. 3d, 11.07 p. m. 4th, 11.45 a. m.; 10.03 p. m. 5th, 5.25 p. m., caused plaster to fall from ceilings. 7th, 5.04 p. m. 9th, 10.19 a. m. 27th, 5.03 p. m.

Smithville: 1st, 1.10 a. m., duration six seconds; 5 a. m., duration eight seconds; 8.30 a. m., duration four seconds; 5.13 p. m., duration eight seconds; 8.40 p. m., duration three seconds; 11.55 p. m., duration three seconds. 3d, 11.02 p. m., duration ten seconds, rattled doors and windows. 5th, 9.04 p. m., duration four seconds.

Wilmington: 1st, 1.10 a. m.; 5 a. m.; 8.30 a. m.; 5.13 p. m.; 8.40 p. m.; 11.55 p. m., these shocks were from three to six seconds in duration. 3d, 11.02 p. m., duration ten seconds, preceded by rumbling sound, caused plaster to fall from ceilings. 4th, 11.03 p. m., duration five seconds. 5th, 9.05 p. m., duration five seconds; 11 p. m., duration five seconds.

Chapel Hill: 3d, 11.05 p. m., duration nearly one minute.

Lenoir: 1st, 5 p. m.; 3d, 10 p. m.

Lincolnton: 3d, 11.05 p. m.

Statesville: 1st, 9.10 a. m.; 4.45 p. m.; 11 p. m. 3d, 10.55 p. m. 6th, 9 p. m. 26th, 8 p. m.

Weldon: 3d, 11.03 p. m.

South Carolina.—Charleston: 1st, 1.02 a. m.; 8.25 a. m.; 9.59 a. m.; 5.16 p. m.; 5.52 p. m.; 11.55 p. m. 2d, 11.53 p. m. 3d, 11.01 p. m. 5th, 11.06 p. m., caused plaster to fall from walls. 7th, 4.52 p. m. 8th, 12.55 p. m. 9th, 1.06 a. m., accompanied by a heavy, rumbling sound. 27th, 2.02 p. m., duration two seconds; caused loose plaster and bricks to fall. 28th, 1.00 p. m.

Spartanburg: 1st, 2 a. m.; 5 a. m.; 8 a. m.; 2 p. m.; 4.10 p. m. 2d, 2 a. m.; 4.10 p. m. 3d, 4 a. m.; 4.10 p. m. 4th, 11 p. m.; duration three seconds. 5th, 11 p. m. 7th, 4 a. m.; 4.30 p. m.; tremors during the night. 22d, 4 a. m. 27th, 4 a. m. 28th, 3 a. m.

Tennessee.—Chattanooga: 1st, several light shocks.

Virginia.—Lynchburg: 3d, 11.10 p. m., duration four seconds.

Norfolk: 3d, 11.02 p. m., duration seven seconds.

University of Virginia: 1st, 10 p. m.

Wytheville: 3d, 11 p. m., duration five seconds; 12 midnight. 24th, 9.56 p. m., duration twenty-five seconds; 10.10 p. m., duration nineteen seconds.

The following is an extract from the "New York Sun" of September 6, 1886:

ATHENS, *September 5th*.—Renewed earth shocks have been felt at Pyrgos, in Morea.

The following extracts are from the "New York Herald":

CITY OF MEXICO, *September 12, 1886*.—An official report to the government from Tequisixtlan, a state of Mexico, says a shock of earthquake, with oscillations from east to west, was felt there between four and five o'clock on the morning of the 3d instant.

CONSTANTINOPLE, *September 26, 1886*.—Sharp shocks of earthquake were felt here and at Smyrna to-day. Slight damage was done.

HAVANA, *September 28, 1886*.—A sharp shock of earthquake was experienced in Saint Thomas on the 20th instant.

FOREST AND PRAIRIE FIRES.

Grand Rapids, Itasca county, Minnesota, 6th: miles of forest to the north of this town are burning, and millions of feet of valuable pine timber have been destroyed.